

Biospheric Sciences Branch Highlights
Code 614.4
January - February 2007

- SCIENCE POLICY AND TEAM MEETINGS, WORKSHOPS

**** Drs. Elissa Levine and Jessica Robin (Code 614.4) host GLOBE-IPY meetings and seminar, January 8, 2007**

Dr. Jessica Robin (SSAI) and Dr. Elissa Levine (Code 614.4) hosted a day long series of meetings and a seminar focused on the new "Seasons and Biomes" GLOBE project and its connection with International Polar Year (IPY). The Seasons and Biomes project is one of 4 new GLOBE projects recently chosen to continue the GLOBE program. The project organizes GLOBE schools by biomes into eight Global Learning Communities (GLCs). Students and teachers will use GLOBE resources and support to conduct scientific investigations in their local environments/biomes under the guidance of educators and scientists from programs including the International Arctic Research Center, and the NASA Landsat Data Continuity and Terra Satellite Missions. This project will contribute to critically needed Earth system science data (e.g. ice, and vegetation phenology measurements for ground validations of remotely sensed data, mosquito phenology data, etc.), which are essential for regional climate change impact assessments and other purposes. During the first phase, students will participate in the International Polar Year (IPY) (2007-2009) through field campaigns and web chats between IPY scientists and GLOBE students from all eight GLCs.

Members of the GLOBE research team, (Dr. Robin and Dr. Levine, and scientists and educators from the University of Alaska Fairbanks (UAF), NSF, and other organizations) met with NASA personnel representing IPY, Landsat, Terra, and Aura, and faculty from Gallaudet University and University of Southern Maine. Meeting topics included reports on NASA education and science efforts related to the Seasons and Biomes project, and the development of materials to make the GLOBE materials accessible to blind, deaf, and students with other disabilities.

A seminar, entitled "International Polar Year 2007-2009: Increasing Our Understanding of the Polar Regions and Raising Awareness of their Global Importance" was presented by Dr. Martin Jeffries, Program Director for the Arctic Observing Network at NSF, and Dr. Elena Sparrow, Director of Education and Outreach of the International Arctic Research Center and the Center for Global Change at (UAF).

**** Assaf Anyamba presents to World Health Organization**

Assaf Anyamba (Code 614.4) presented "Rift Valley Fever Outbreak Risk for 2006 - 2007" to the Joint World Health Organization (WHO) - Kenya Government Working Group: Review of Current Rift Valley Fever (RVF) Control Activities and Formulation of National Strategy, January 10, 2007, Nairobi Kenya. This information has been published on Food and Agricultural Organization (FAO) Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases website http://www.fao.org/docs/eims/upload//217874/EW_hornafrika_nov06_rvf.pdf and disseminated to countries in the Horn of Africa region as an early warning for possible RVF activity in the Horn of Africa. The information is currently being used by a combined task force of the Government of Kenya (GoK), WHO, FAO, CDC and DoD to mobilize resources combat and control of the current outbreak.

**** Rift Valley Fever Outbreak in the News**

Interest in the research work of Assaf Anyamba (Code 614.4) on forecasting Rift Valley Fever outbreak from weather patterns led to an interview with the Associated Press. According to the AP the story was picked up by about 150 media outlets including the Chicago Tribune, Washington Post and New York Times as of January 31st. See weekly highlight of February 7, 2007 for details.

**** The Carbon Cycle & Ecosystems Office (Code 614.4) hosted first "all-investigator" meeting of the North American Carbon Program**

The Carbon Cycle & Ecosystems Office (Code 614.4) planned, staffed, and hosted the first "all-investigator" meeting of the North American Carbon Program in Colorado Springs, 22-24 January, followed by the Joint Canada-Mexico-USA Carbon Program Planning Meeting, 25-26 January.

Full details may be found at

<http://www.nacarbon.org/2007_meetings/index.htm>http://www.nacarbon.org/2007_meetings/index.htm

The NACP is an interagency research program designed to quantify and predict sources and sinks of carbon in North America, and lay the framework for more informed carbon monitoring and management.

The goal of the NACP meeting was to foster a community of NACP scientists that can effectively tackle complex, crosscutting issues to resolve uncertainties in understanding and managing the carbon cycle of North America and adjacent oceans. The meeting was attended by 238 participants from academic and

government research centers associated with carbon cycle issues in North America. In addition to the researchers, there was also a strong presence from federal program managers from the Carbon Cycle Interagency Working Group (NASA, NOAA, NSF, USDA, USGS) and the US Climate Change Science Program Office.

Two Code 614.4 scientists gave invited plenary presentations. Jeff Masek spoke on Remote Sensing in the NACP and Peter Griffith (SSAI), the NACP Coordinator, spoke on Data Systems and Programmatic Communication for the NACP. Jon Ranson, Betsy Middleton, Jim Collatz, all Code 614.4 and Amy Morrell, Code 614.4/SSAI also attended and made poster presentations. The meeting organizers plan on writing an EOS article to publicize the results of the event.

The goals of the Joint Carbon Meeting were to:

1. Identify science questions/goals/objectives for a Joint North American Carbon Program (JNACP)
2. Define collaborative and synthesis activities
3. Consider relationships to other regional carbon studies and potential roles in other international carbon research
4. Discuss research planned or underway in each country

The Joint meeting had 141 participants, and included government agency representatives from Canada and Mexico as well as the USA. A white paper on collaborative carbon cycle science is expected as a product.

**** Betsy Middleton attends Vegetation Fluorescence workshop and Mission Assessment Group meeting for the Fluorescence Explorer**

Betsy Middleton (Code 614.4) attended the "3rd International Workshop on the Remote Sensing of Vegetation Fluorescence" held in Florence, Italy on February 7-9. She gave an oral presentation, was co-author for two posters and served on the Science Committee for the workshop.

In addition, she traveled to the European Space Research and Technology Centre (ESTEC) in Holland February 12 and 13th to continue her role as "outside reviewer", participating in the second meeting of the Mission Assessment Group for the Fluorescence Explorer (FLEX) mission concept under development by European Space Agency (ESA).

**** Code 614/614.4 personnel meet with Intertribal Timber Council (ITC)**

On an invitation arranged by Ken Bailey, (Code 614), a geospatial technology specialist on detail to GSFC from the U.S. Department of the Interior, a Landsat team consisting of Drs. Darrel Williams (614), Ross Nelson (614.4), and Randy Wynne (Va. Tech), Landsat E&PO specialist Jeannie Allen (SSAI), and Mr. Bailey (Dol) traveled to Palm Springs, CA to meet with the Intertribal Timber Council (ITC) on February 21-22 to introduce member Nations to the multiple values of integrating remote sensing into routine Tribal timbering practices. The ITC fully endorsed the idea and intends to make a formal request to the Secretary of the Interior that the Bureau of Indian Affairs institute such a program as soon as possible. ITC is an influential consortium of 58 Tribes from across the continent.

- FUNDED RESEARCH

Publications Published / in Press:

Anyamba, A., Chrétien, J.P., Small, J., Tucker, C.J., Linthicum, K.J., Developing Global Climate Anomalies Suggest Potential Disease Risks for 2006-2007. International Journal of Health Geographics 2006, 5:60
doi:10.1186/1476-072X-5-60
<http://www.ij-healthgeographics.com/content/5/1/60>

Fensholt, R., Anyamba, A, Stisen, S., Sandholt, I., Pak, E., Small, J., (2006), Comparisons of compositing period length for vegetation index data from Polar-orbiting and Geostationary satellites for the Cloud-prone region of West Africa. Special Issue: Cloud-prone and Rainy areas Remote Sensing (CARRS) Photogrammetric Engineering and Remote Sensing (In Press)

Chretien, J.P., Anyamba, A., Bedno, S., Breiman, R., Sang, S., Sergon, K., Powers, A., Onyango, C., Small, J., Tucker, C.J., Linthicum, K.J. Drought-associated Chikungunya Emergence along Coastal East Africa. America Journal of Tropical Medicine and Hygiene. (In Press)

- SIGNIFICANT ACTIVITIES

**** Dr. A. Lyapustin and Y. Wang finish Algorithm Theoretical Basis Document (ATBD) for new atmospheric correction algorithm**

Dr. A. Lyapustin and Y. Wang have finished the Algorithm Theoretical Basis Document (ATBD) for the new atmospheric correction algorithm MAIAC - Multi-Angle Implementation of Atmospheric Correction for MODIS. The research and development were funded by NASA EOS Science grant (Dr. D. Wickland). The ATBD was submitted to NASA HQ for a review.

MAIAC is generic algorithm which uses gridded multi-day MODIS observations in order to simultaneously retrieve aerosols and surface anisotropic reflectance. The algorithm works globally over all surface types with temporary exception of snow. MAIAC products include cloud mask, water vapor, aerosol optical thickness (AOT) at 0.47 μm and 0.66 μm and Angstrom parameter, surface spectral bidirectional reflectance factor (BRF), direct BRF, and albedo for MODIS land bands 1-7, and ocean bands 8-14L, which are not saturated over land. All products are generated uniformly at 1 km resolution in gridded format. The suit of products is fully compliant with energy conservation principle in a sense that the radiative transfer computations with retrieved parameters reproduce measurements with high accuracy. A requirement of consistency of the time series of retrieved BRF provides an additional constraint enhancing quality of aerosol and surface retrievals.

The ATBD describes the radiative transfer basis, and theoretical basis for the water vapor, cloud mask for land applications, aerosol and atmospheric correction algorithms. We also give examples of validation of water vapor and AOT with AERONET measurements, and initial comparisons of cloud mask, AOT and surface reflectance with MODIS operational products MOD35, MOD04 and MOD09/MOD43, respectively, for different regions of the world.

The ATBD can be found at

<http://neptune.gsfc.nasa.gov/bsb/subpages/index.php?section=Projects&content=SHARM> , in the menu item "MAIAC ATBD".

As a simple demonstration of the new algorithm, the flash movie ("movie.swf") shows the time series of the nadir-adjusted BRF at solar zenith angle 45° for the Zambia region (1200 by 1200 km²), covering the dry season of 2005 from day 126 to day 280. The first several frames, showing initialization of the algorithm, have the time step of 2-3 days. After initialization, which takes 10-14 days, the time step is approximately 10 days. It shows a gradual phenology change in the region associated with growing soil moisture deficit and draught. It also shows

the fire-burnt areas as a result of biomass burning south-west of the (big black) lake, towards the end of the dry season, and other areas of human activity. On Feb. 26, 2007, Dr. Lyapustin gave a Laboratory for Atmospheres Special Seminar "MAIAC - Multi-Angle Implementation of Atmospheric Correction for MODIS".

**** Dr. Lyapustin gives NOAA/NESDIS/ORA seminar**

Dr. Lyapustin gave a NOAA/NESDIS/ORA seminar on Jan. 25 entitled: A generic aerosol retrieval - atmospheric correction algorithm for MODIS, by Alexei Lyapustin and Yujie Wang.

**** Important Landsat activities occurring**

-- Landsat staff partnership with the Library of Congress

Landsat staff (Code 614.4) have developed a partnership with the Science, Technology, and Business Division of the Library of Congress to provide four public presentations by GSFC scientists during 2007. Bob Bindschadler gave the first presentation, "Who Left the Freezer Door Open: What the Poles Are Telling Us about Climate Change," on January 24. About 115 people came from the Library, the Congressional Research Service, The Climate Institute, the U.S. State Department, and the public at large. Paul Hertz from NASA HQ also was in attendance and congratulated Bob after his talk for a job well done. The next presentation will be on April 3, 2007, by Wayne Esaias, "Honey Bees, Satellites, and Climate Change." For more information, contact Jeannie Allen, Code 614.4/SSAI.

-- First Landsat Science Team Meeting

The inaugural meeting of the USGS-sponsored Landsat Science Team was held Jan. 09 - 11 at USGS EROS, Sioux Falls, SD. USGS selected 17 members in Oct. after competitive evaluation of proposals. The USGS selected eight funded investigators from academia and private industry and selected six U.S. civil servants plus three international investigators without research funding. The selected civil servant principal investigators include Bob Bindschadler, GSFC Code 614, Hydrospheric and Biospheric Sciences Laboratory. The Team contains a good mix of former Landsat 7 Science Team members and new members. USGS & NASA LDCM Project Scientists, Tom Loveland & Jim Irons, Code 614.4, respectively, will co-chair team meetings.

The Team received briefings on the LDCM, the status of Landsat 4 & 5, the Landsat Data Gap Study, the Mid-Decadal Data Set Initiative, and the Future of

Land Imaging Interagency Working Group. NASA personnel provided briefings and otherwise supported the meeting. NASA representation included LDCM Project Manager Bill Ochs, LDCM Project Scientist Jim Irons, LDCM Deputy Project Scientist Jeff Masek, LDCM Ground System Manager Vicki Zaroni, LDCM Program Executive Ed Grigsby, and Landsat 7 Project Scientist, Darrel Williams (a selected co-investigator).

The Science Team also presented synopses of their individual research projects, selected Dr. Curtis Woodcock, Boston University, as their Team Leader, and drafted a letter strongly advocating for the inclusion of a thermal infrared imaging instrument on the LDCM. The letter will be sent to NASA Administrator Michael Griffin and USGS Director Mark Myers by Dr. Woodcock on behalf of the team.

The next meeting was tentatively schedule for June in Corvallis, Oregon. Hopefully the selection of the OLI builder will be announced before the meeting.

-- Informal Visit by Gene Whitney, OSTP

On Wed., Jan 17, Dr. Gene Whitney of the Office of Science and Technology Policy (OSTP) came out to Goddard to attend the retirement luncheon for Dr. John Barker that was held at the GSFC Rec Center. He also visited the Landsat 5/7 Mission Control Center (MOC) in Bldg. 32 and held some informal Landsat-related discussions with Jim Irons and Darrel Williams in Williams' office in Bldg. 33. Gene wanted us to treat his visit as a low profile, colleague to colleague visit this time around, and he hopes to be a member of an official OSTP delegation that may visit Goddard in the March time frame for more formal Center briefings (exact dates are still TBD). Gene chairs the Future of Land Imaging Interagency Working Group.

-- For just the Biospheric Sciences Branch: Request for Proposals Released for LDCM Operational Land Imager (OLI)

NASA released a Request for Proposals (RFP) for a reflective band imaging sensor for the Landsat Data Continuity Mission (LDCM) on January 09, 2007. The sensor has been labeled the Operational Land Imager (OLI) and the RFP was posted on the NASA Acquisition Information System (NAIS). Proposals are due February 23, 45 days after the release. Selection is expected by June leading to a July 2011 target launch date.